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Missed Connections: The Adoption of Information Technology in Canadian Healthcare

Despite the ambitious efforts of Canadian governments to amass digitized health data there will not be any large-scale benefits until the information is shared between providers and institutions.

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The Study In Brief

Despite the ambitious efforts of the provincial and federal governments in Canada to implement Electronic Health Record (EHR) systems, the level of health information exchange across organizations and care settings in Canada is among the lowest in surveyed countries. Some survey findings revealed that in primary care only 12 percent of physicians are notified electronically of patients' interactions with hospitals or send and receive electronic referrals for specialist appointments. Fewer than three in ten primary care physicians have electronic access to clinical data about a patient who has been seen by a different health organization.

Certainly, progress has been made, namely in the development of the infrastructure to store and share health information, as well as some use of information technology in primary care, but the delivery of healthcare in Canada has yet to take full advantage of the major potential benefits.

The aims of EHR programs include reducing duplication of, and errors in, patient records; taking advantage of information and communications technology to improve patient outcomes – by delivering patient and medication data to where and when it is needed; and saving the time of patients and providers.

In Canada, there will not be any large-scale benefits from gathering masses of health data until the information is shared among providers and institutions, such as between a family physician and a hospital. Leadership is required to drive continuous change and quality improvement toward integrated care. To do so, appropriate incentives are also required. Providers and provider teams need to be held accountable for improvements to happen.

One key characteristic shared by many leading healthcare jurisdictions is the incentive to improve outcomes for patients at risk, in contrast to the fee-for-service reimbursement models that create incentives for higher treatment volumes. Leaders need to set goals and incentives for improved quality of outcomes and hold institutions and clinicians accountable for achieving those goals.

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Canada's federal and provincial governments have made large efforts, often at great cost, to digitize patient health information. Using electronic health records (EHR)[1] can reduce errors in patient records, eliminate duplication of tests and procedures, and improve patient outcomes by delivering patient and medication data where and when it is needed, while saving the time of patients and providers.

There are many global EHR successes – and numerous expensive failures – to learn from. In Canada, the failures are well documented in numerous auditor general reports, both at the federal and provincial levels. This *Commentary* recognizes EHR's challenges and past shortcomings, yet expresses optimism that the many benefits achieved by others may be realized in Canada.

Progress has been made, namely in the development of infrastructure to store and share health information. There have also been successes in the use of information technology in primary care; however the delivery of healthcare in Canada has yet to take full advantage of EHR's potential.

Analyses of EHR programs worldwide show they can improve the quality of care and reduce patient risk, for example, by cutting prescribing errors and by providing and sharing information promptly, which are vital for people with complex conditions whose care is often provided by several different clinicians and organizations.[2] When properly implemented, EHRs also free up nurses' administrative time, allowing more opportunity for direct patient care. Furthermore, linking data from different organizations helps determine how well a patient has been treated in the course of an illness, whether treatments and services are having the impact desired and how they might be improved.

This *Commentary* looks at the progress that Canada's provinces have achieved, where they have faltered, and at the obstacles to the further development and expansion of EHRs. As well, it proposes ways to increase the likelihood that the public can reap the benefits associated with greater exchange of health information. While failures are well reported publicly, there are less

Parts of this report were drawn from collaborative research conducted with Bill Pascal, formerly of the Canadian Medical Association. The comments and editorial review provided by Colin Busby and the external referees are gratefully acknowledged.

1 For readability, I use EHR to refer to a wide set of technology related to health information. Among practitioners, distinctions are often made between electronic medical records (EMRs) and EHRs, where the former refers mainly to the use of health information by clinicians for diagnosis and treatment, whereas EHRs are much broader in scope and encompass a much wider set of information than EMRs. For example, EHRs extend beyond clinicians to encompass healthcare organizations such as hospitals and community clinics.

2 See Protti (2009) for a discussion of the success stories in the United States, in particular Kaiser Permanente in California and the Veterans Health Administration.

well-documented relative successes. One potential measure would see governments and providers – perhaps as part of compensation negotiations – adopt a set of principles that emphasize the role and use of EHR systems in clinical practices, as well as formal commitments to open up primary care records to patients by fixed dates.

The Canadian healthcare sector faces serious challenges that have an impact on EHR. Fiscal consolidation is causing most provinces to reconsider their funding for electronic technology programs. And healthcare delivery is increasingly focusing on lower-cost locations – such as in homes and communities – with mobile technology helping overcome geographic issues. Furthermore, demographics and technological advances will put pressure on health system design and provider responses.

But bringing care closer to the patient, strengthening the linkages between outcomes and accountability and giving the patient a more active role, require interconnectivity, or the electronic exchange of health information. The level of health information exchange across organizations and care settings in Canada is among the lowest across surveyed countries (Health Council of Canada 2012, Accenture 2012). Some findings reveal that only 12 percent of primary care physicians are notified electronically of patients' interactions with hospitals or send and receive electronic referrals for specialist appointments. Fewer than three in 10 primary care physicians have electronic access to clinical data about a patient who has been seen by a different health organization (Accenture 2012).

In what follows, I discuss how healthcare systems in the United States and abroad have addressed some of these challenges. I place lessons from abroad into the Canadian context, where integrated care is difficult to achieve and there are few incentives for providers to maximize the benefits of EHRs.

Potential Benefits of EHRs

In principle, EHRs could serve a number of valuable purposes.[3] Patients generally wish to use their health information to get faster access, better care and reduce clinical practice errors, including redundant testing and diagnostic procedures. For providers, EHRs can inform clinical care, public health officials and biomedical researchers. It can also result in cost-effective care, as well as facilitate better communication among healthcare providers and with patients.

Examples of these benefits can be found in health regions with well-advanced EHR systems. In many parts of the United States, enhanced EHR has allowed for reduction in mortality rates, greater completeness of medical records and improved evidence-driven protocols for medical procedures (Box 1). Whether any of these benefits can be realized depends not only on the framework for the exchange of health-information technology but also on implementation details, such as who will lead change, how clinicians will be involved and what incentives will be included to encourage greater exchanges of information.

Electronic Health Globally

A number of organizations and individual researchers have documented at least part of the global EHR picture (Anderson 2006, Protti

3 See Jason (2014) for more.

Box 1: Realized Benefits from EHR Adoption: Select US Examples

Shortly after Banner Health – a large US healthcare organization that offers emergency, hospital and long-term care services in seven western states – completed its first facility, it implemented an enterprise clinical information system. This system subsequently identified areas that showed significant gains in using EHR, including a 7-percent-reduction in average length of stay, an 18-percent-reduction in pharmacy costs and an 84-percent-reduction in adverse drug events. Similar reductions, and others, were observed in all Banner facilities as the standardized EHR was implemented. By using the unique capabilities of its enhanced EHR, Banner physicians have achieved sepsis mortality rates in ICUs of 14 percent to 15 percent compared to the national average of 25 percent to 50 percent (Banner Health 2015).

The Chicago-area NorthShore University Health System was the first US health system to connect hospitals and physician offices through an electronic database. In 2003, NorthShore's then three hospitals and 68 physicians' office locations exclusively moved to EHRs, eliminating all paper charts. In 2008, NorthShore's professional staff passed a bylaws revision in effect stating, "If you are going to treat patients in our system, you must use the NorthShore EHR." The health system has since added 50 independent physician practices that also use the system. Among other things, NorthShore has demonstrated that computer-based ordering of chemotherapy is more complete than paper ordering and provides a greater level of safety and satisfaction for staff. The outcomes of one of its studies comparing paper charts to EHR showed that using computerized physician order entry improved completeness of the medical record and chemotherapy order documentation to 93 percent from 67 percent as well as user satisfaction with the medical record system (Himss Analytics 2015).

At Intermountain Healthcare in Utah and Ohio, data from patients is fed to 60 clinical teams who routinely compare it to current protocols, track variances in care and make updates where appropriate (15 percent to 30 percent of the time). Any revised protocol has to be validated empirically in real practice. Once changes are identified, the information technology teams have just two hours to input them to Intermountain's clinical information system in order that feedback to frontline clinicians is as quick as possible. For example, nearly one-third of pregnant women were having elective inductions. Analysis identified that 28 percent of these inductions were clinically inappropriate, resulting in risks of harm to the newborn, higher use of intensive care, higher rates of maternal injury and higher rates of C-sections. A protocol was developed to identify when induction was appropriate. It was implemented through the EHR system, enabling all clinicians to access it and requiring that any decision to induce an earlier birth that fell outside the protocol required clearance by the most senior staff. As a result, the 28 percent inappropriate inductions fell from to 1 percent and 750 hours of labour and delivery staff time was saved; in addition intensive care admissions were reduced (Intermountain Healthcare 2011).

2007, Schoen 2012, etc).[4] Unfortunately, there is no comprehensive picture of global EHR implementations. None cover all nations, while many deal only with a single sector (e.g., the use of health-information technology in primary care). That said, there is some reliable and trustworthy evidence that many health regions have effectively introduced EHRs over the past 20 years.

Financing levels, economic structure, size and cultural issues – including public and professional attitudes to privacy – play a role in shaping EHR practice. Creating a cohesive EHR system requires the following steps.

I. **Amassing data** – through a) the use of electronic medical records in physician offices and in healthcare facilities and b) the development of registries and databases of patient data.

II. **Exchanging data** – by permitting electronic access to patient data outside individual offices and healthcare facilities through a) registries and image repositories, b) the transfer of clinical messages, including secure email, such as referrals for specialists, admissions and treatments when in hospital, etc., and c) the ability of telehealth providers to access patient information and document the encounter.

III. **Analyzing data** – through a) the amalgamation of data into databases and data warehouses and b) the use of analytics and business intelligence tools to retrospectively analyze patterns in order to influence care protocols and resource distribution.

Many countries have focused on amassing EHR data, putting in place the infrastructure necessary to capture health information at the various points of service. Their major efforts and investments are on creating large data-capture repositories for drug, laboratory and digital images, registries for clients and providers, and connecting the healthcare system's disparate parts. Such an emphasis has also focused on point-of-care electronic health capabilities in primary and secondary (acute) care settings.

In addition to amassing data, a number of jurisdictions have, for many years, been successfully exchanging data between healthcare providers and organizations such as insurers, public health bodies and hospitals. A few of these include Denmark, New Zealand, Scotland, Hong Kong, Lombardy in Italy, Madrid in Spain, as well as Indiana, Massachusetts and Seattle's Group Health organization. It is at this level of functionality that EHR's additional value appears from a clinical point of view and from a system-efficiency perspective. While the first phase (amassing data) has had the same challenges of any large-scale information technology project, the second phase – creating the interoperability to move the data about the system – tends to prove more difficult.

Unlike other industries, such as banking, retail and air travel, very few health systems have advanced approaches to analyzing data. Evidence

4 Anderson (Commonwealth Fund) – 2006, Protti (Canada Health Infoway) – 2007, Schoen (Commonwealth Fund) – 2006, Emperica (European Union) – 2007, Jha – 2008, HIMSS – 2008, Gartner (Sweden Ministry of Health and Social Affairs) – 2009, Castro (Information Technology & Innovation Foundation) – 2009, Schoen (Commonwealth Fund) – 2009, Emperica (European Union) – 2010, WHO Atlas of eHealth country profiles – 2011, Deloitte (European Union) – 2011, Accenture – 2012, Schoen (Commonwealth Fund) – 2012, Benchmarking Deployment of eHealth among European General Practitioners – 2013, European Hospital Survey: Benchmarking Deployment of e-Health Services (EU) – 2013, Magrabi (Australian Institute of Health Innovation) – 2013, Strengthening Health Information Infrastructure (OECD) – 2013, Alder-Milstein (OECD) – 2014.

from other industries suggests that it is at this analytical level that the largest gains are realized. However, having the first two phases completed are prerequisites for this last phase.

Health Information Technology in Canada

Canadian electronic health information use started in the early 1960s when some hospitals sent abstracted discharge data to the University of Michigan Medical School for processing – few Canadian hospital laboratories had 'data processing' equipment. Subsequently, the Canadian healthcare system has made considerable progress, particularly in primary care (Health Council of Canada 2012). In the past six years, for example, there has been a substantial shift to computerized medical charts and electronic prescribing of medications, though their use varies widely among provinces with Alberta, British Columbia and Ontario leading the way.

In total, Canada has spent more than $10 billion on EHR technology over the past 15 years, according to the federal Auditor General's 2010 report. Most of this money went to developing the infrastructure to store, retrieve and share health information, with less used toward encouraging the use of electronic health records by primary care providers, who are the most positive about its benefits. Indeed, the 2013 National Physician Survey reported that two out of three family physicians indicated electronic health records facilitate better quality of care. On the other hand, only one-half of specialists felt that the use of electronic health records increases quality of care (CMA 2013).[5]

That said, the Health Council of Canada has found that while progress has been made on the integration of EHR into the care systems of many countries, Canada lags. This is true particularly for primary care physicians' ability to carry out higher order functions such as e-prescribing, receiving discharge summaries, receiving reports from specialists, receiving lab results electronically, preventative care follow-up, generating a medications list, providing clinical summaries and sending reminder notices (Schoen et al. 2012).

Health-information exchange is still relatively limited (Accenture 2012) in Canada, though there is a wide array of EHR projects underway within very different healthcare settings, from single-hospital environments to hospital networks and regional health units and, in some cases, province-wide systems.

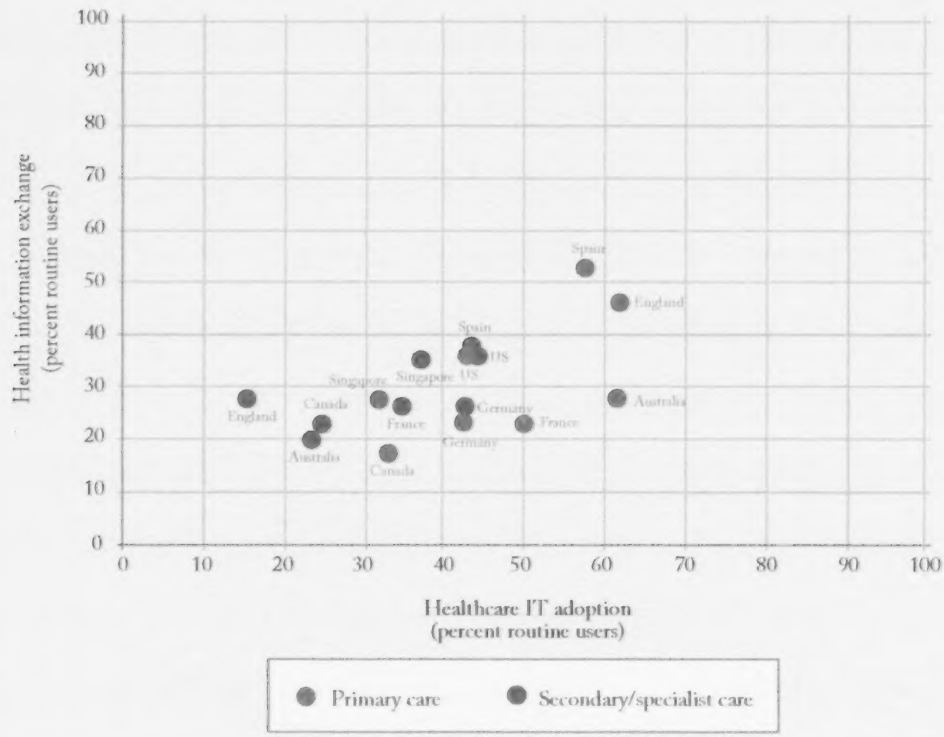
In Canada, the exchange of health information at the secondary care level is slightly more mature than for primary care: 28 percent of secondary care physicians communicate electronically with clinicians in other organizations and 34 percent have electronic access to data about a patient who has been seen by another organization.

When it comes to EHR in Canadian hospitals, the best comparative tool is the HIMSS Analytics electronic medical records adoption model (EMRAM).[6] The EMRAM is an eight-stage model that allows a healthcare organization to track its level of adoption and assess itself against other healthcare organizations. When compared to the United States, few Canadian health organizations have introduced electronic clinical documentation and a computerized physician referral system, as well as electronic notification of hospital admission

5 One study reported benefits such as decreases in unnecessary repeat tests ($584 million saved across Canada), medical practices being more productive ($800 million saved) and improved patient safety (PwC 2013).

6 http://www.himssanalytics.org/emram/.

Figure 1: Connected Health Maturity Index: Primary Care vs. Secondary/Specialist Care



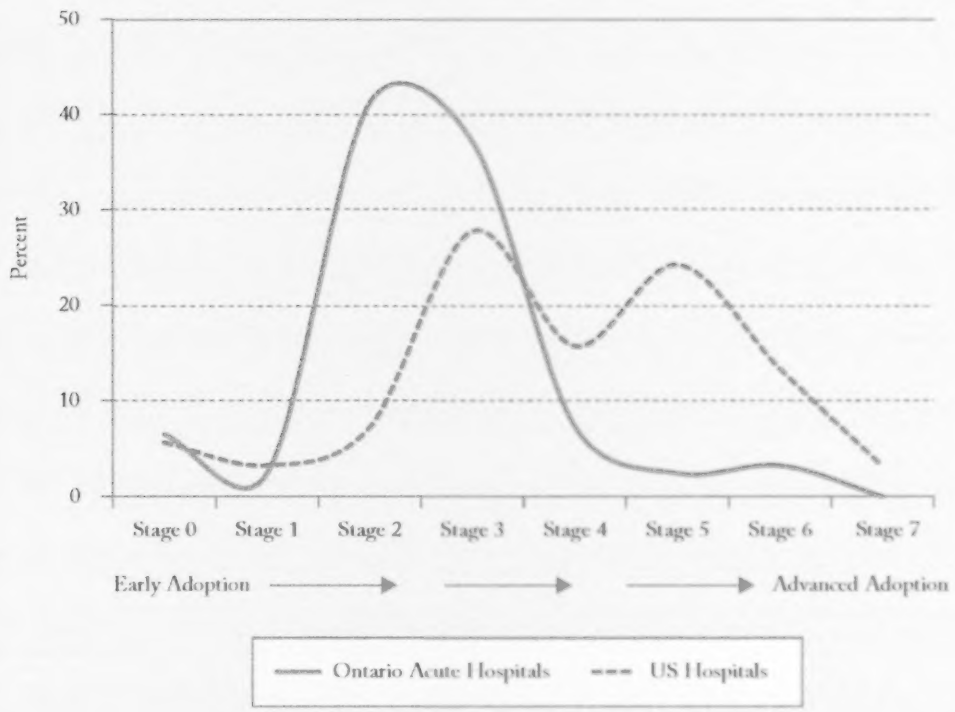
Source: Accenture (2012).

and interaction with other health professionals. Even fewer have gone as far as Toronto's North York General Hospital in introducing: i) advanced electronic medical records; ii) standardization on evidence-based care; iii) safe prescribing and medication administration; and iv) clinical decision support rules and alerts.

The 2009 US incentives such as the *Health Information Technology for Economic and Clinical Health* (HITECH) *Act*, which provided large subsidies to providers for the adoption of health information technology, appears to have driven further EHR implementation (Figure 2). This is a tentative finding, because these US organizations had been applying quality improvement techniques and practices before the legislation, making it hard to determine the unique influence of the *HITECH Act*.

The federal government through Canada Health Infoway, the independent body that promotes the adoption of health information technology, has funded efforts toward achieving national information technology and communications standards, electronic patient registries and digital

Figure 2: Progress of EHR Adoption in Ontario and US Hospitals, 2014



Source: Ontario Hospital Association.

imaging (Rozenblum et al. 2011). Canada Health Infoway's 2014-2015 Corporate Plan notes that Canada has made significant progress on its objective to improve health and healthcare delivery by putting the right information in the hands of Canadians and their healthcare providers. An early focus was digitizing key information – such as demographics, imaging, laboratory test results, medication history, and immunizations – so that it could be shared with authorized health professionals. In partnership with Canada's federal, provincial and territorial governments, Infoway has led these electronic health record investments.

When it comes to telehealth – connecting remote patients to caregivers by phone or video – a 2012 study of eight countries found that Canada is at the forefront of using this communications vehicle to deliver medical services (Alharthi 2012). Between 2006 and 2010, the rate of annual growth of clinical events using telehealth was 35 percent compared to growth rates in the order of 5-10 percent per year in the 1990's. Growth continued between 2010 and 2012, with clinical services delivered through telehealth increasing by almost

55 percent (Canadian Telehealth Report 2013). Altogether, this is a near tripling in the last six years, reflecting telehealth's adoption by providers and patients as an increasingly mainstream method of delivering healthcare services.

Key Themes from Leading Jurisdictions

Virtually every Western nation has aimed at replacing its paper medical records with shareable electronic versions. The extent to which this has been achieved is difficult to determine owing to problems with definitions and the lack of objective reliable data (Jha et al. 2008; Adler-Milstein 2014). Another aspect that makes reliable international comparisons difficult is the reality that healthcare in many countries is a regional or provincial responsibility and, as a result, local EHR strategies may or may not coincide with a national one.

Health regions such as Andalucía in Spain, Clalit Health Services in Israel, the Hong Kong Hospital Authority, Lombardy in Italy, Norbotten and other counties in Sweden, and the previously mentioned US healthcare organizations described in Box 1, are some examples of highly successful EHR applications at a regional level. When such regional approaches differ and have varying degrees of success, it is a challenge to establish the national status. Nonetheless, Canada can still learn from these generalized comparisons.

Most health systems are as yet unable to achieve the documented benefits realized by integrated US healthcare delivery organizations such as Intermountain Healthcare, Kaiser Permanente, the Veterans Health Administration, Allina Health, Banner Health, Northshore and others. These organizations have improved clinical care in part due to a single comprehensive electronic health record that all clinicians use. They have also shown cost savings by reducing duplicate tests and adverse drug events as well as enhancing patient safety.

One Canadian province with the potential to make substantial progress on the integrated care front is Alberta. Alberta Health Services, which encompasses all of the province's hospitals, primary care networks and its strategic clinical networks, is well positioned to provide integrated care that entails professionals from different organizations working together in a team-oriented way to provide high-quality patient care. The same process could occur in Ontario, where family doctors are paid on a blended capitation-based model that fosters an integrated-care approach. As other provinces grow away from fee-for-service for family doctors, this could become an impetus for change as well.

Analysis of successful organizations reveals some similar characteristics. Most have what could be called a "one-patient, one-record" clinical information system. Their EHRs are integrated because they use a single financing system with a common look and feel and a single patient record in their databases for all authorized caregivers. As in the case of other industries with data warehouses, their EHRs supply the rich clinical data to their warehouses from which analytics can be performed for quality improvement and resource utilization. They also act on the evidence generated by variation analysis to establish standard-order sets, protocols and processes and embody them into their EHR/clinical information systems that support their day-to-day care processes.

It must be kept in mind that these health systems are single comprehensive financing units that cover a patient's health expenses throughout the system. Since public healthcare in Canadian provinces mainly finances hospitals and physician services, provincial and healthcare decision-makers do not face compelling financial incentives to improve performance.

There are a number of valuable lessons that can be taken away from the study of jurisdictions successfully exchanging and analyzing data. Common elements of success include:

1) Leadership

The most prominent qualitative finding is the need for executive and clinical leaders who articulate

a strong vision for information technology in healthcare, engage stakeholders and help formalize integration and quality of care as dominant objectives.

2) Clinician involvement

The importance of clinician involvement (physicians, nurses and other healthcare providers) has been known for many years (Sittig 1994). It is imperative that clinicians play a significant role in the planning, design and implementation of an EHR system. They use the system day in and day out, and should be involved in the decision-making process.

3) Governance

One very important tool is a data and information governance board sponsored by the healthcare organization's Chief Executive Officer. Maintaining stakeholder control of data builds trust and enhances participation.

4) Change Management

Practice changes culture. One of EHR leaders' key messages is that information is a necessary but not sufficient condition to achieving integrated care. A large portion of costs (perhaps two-thirds) at Kaiser Permanente, for example, was attributable to training and workflow re-designs along with communication and change management. Kaiser's HealthConnect initiative changed semi-autonomous regions into sharing, learning partners linked by technology that resulted in more effective and efficient service delivery to patients. A few of the benefits include: 2.9 million lab results are accessed online monthly, 1.2 million prescriptions refilled online monthly and 300,000 appointments are scheduled online monthly.[7]

5) Incentives

Denmark presents a classic example of a successful incentive policy. To encourage primary care physicians to communicate electronically with their patients, the funding authorities pay them twice as much for an email communication as for an office visit (Protti et al. 2009; Roland and Campbell 2014). Elsewhere, the UK National Health Service in 2004, introduced the Quality and Outcomes Framework, which is the most comprehensive national primary care pay-for-performance program in the world (Gillam 2011). Each of the four countries comprising the UK has its own tax-funded national health service, with approximately 40,000 practitioners in total working in approximately 10,000 practices.[8] General practitioners have agreed to increases in income according to performance with respect to 146 quality indicators covering clinical care for 10 chronic diseases, organization of care and patient experience. A very recent publication reviews the changes made to the program and its successes and failures since it was introduced a decade ago, highlighting the importance of focusing incentives on intrinsic versus extrinsic values (Roland and Campbell 2014).

Key Challenges in Canada

The above examples of conditions that encourage successful EHR implementation are generally drawn from health systems with a single financing unit, unlike the Canadian context where healthcare

7 http://share.kaiserpermanente.org/total-health/connectivity/.

8 See National Health Service's Quality and Outcomes Framework at http://www.ic.nhs.uk/statistics-and-data-collections/audits-and-performance/the-quality-and-outcomes-framework.

is traditionally broken up into silos and usually falls under provincial responsibility. Indeed, healthcare delivery in Canada, as in many countries, is characterized by fragmentation at national, provincial and local levels. Care is delivered by multiple providers, in multiple care settings, and often without systematic coordination and communication. As a result, such division of healthcare delivery leads to lower quality of care, medical errors, inefficient service delivery, higher costs and patient dissatisfaction.

In 2000, Leatt, Pink and Guerriere (2000) attributed Canadian regional health authorities' inability to provide comprehensive integrated care because they were not responsible for what drugs were dispensed from retail pharmacies and for medical care provided by physicians. Fifteen years later, there has been limited progress toward integrated care. One of the reasons is that the necessary infrastructural arrangements, such as shared electronic patient records, regional collaboration and a clear, transparent incentive structure, are still not in place.

The Romanow Royal Commission on the Future of Health Care in Canada and provincial studies by former politicians Dan Mazankowski and Claude Castonguay recommended investments in province- or nation-wide EHRs, with the implicit assumption that the associated costs would be more than offset by improvements in clinical outcomes and efficiencies. This means going beyond using EHRs to amass data toward a more radical integrated-care reform model.

Overall, EHRs should be part of a larger package of reforms. Otherwise, their potential value will be small. It might be that evidence-based integrated delivery systems are being held up as positive approaches because of their implications for compensation and governance models for hospitals, doctors and other providers. Perhaps, as provinces re-evaluate and redesign the payment models for these major providers, they should include conditions that stipulate the importance of EHR adoption within revised payment systems.

Meanwhile, governments in Canada are slowly moving away from the fee-for-service model of physician compensation. For family physicians, there are strong arguments to be made in favour of a blended payment scheme with a focus on pay-per-patient – commonly known as capitation – to encourage physicians to keep patients healthy and focus on their sickest patients (Blomqvist and Busby 2012). Furthermore, a recent study has concluded that the right mix of pay incentives should be based on principles that consider healthcare goals, global experience and human motivation (Conference Board of Canada 2014). It adds that pay structures need to support team-based care, doctors' basic motivations to provide care and improvements in overall healthcare.

Recent research has also noted the movement away from funding hospitals with global budgets toward a share of activity-based funding that pays hospitals for the number and type of services provided (Sutherland et al. 2013). With respect to EHRs, many of these aforementioned reforms can be constructed to encourage their use and broaden their adoption by caregivers.

Recommendations

The federal government and the provinces, along with professional health-related colleges and associations, should adopt EHR policies that are based on principles that incorporate elements of clinician involvement, governance issues, incentives for adoption and culture change based on how clinicians would like EHRs to be used. Among the principles that should form the basis of a Canadian EHR system are:

- Shared electronic records should be regarded as essential to care as the stethoscope and the thermometer;
- Features of electronic record systems that get in the way of effective clinical practice should be regarded as safety issues that need to be resolved as a priority;
- Clinicians should have a single point of access to

electronic records about patients they are treating, regardless of where the record was created;

- Patients and their caregivers should not find relevant data inaccessible, expensive to access or at risk of loss because of commercial or financial decisions made by EHR system vendors; and
- Patients should ultimately be able to access their EHRs online. As found in US healthcare organizations such as Kaiser Permanente and Geisinger, patients, as consumers, are playing an increasing role in the delivery of healthcare. In Canada, this will lead to increasing demands for innovation and change in how healthcare is provided – including giving patients full online access to their data.

Adopting such principles, perhaps in the context of compensation negotiations with providers, would then lead to setting specific policy in a number of arenas.[9] Hospital and primary care records should be opened up. A commitment should be made to ensuring patients have access to all electronic information held about them, within existing data protection rights.

The Canadian Institute for Health Information, or some other national organization, could be tasked to develop a plan for health data analysts to enable local and regional organizations to better use the data that they have, or will soon have, available. Similarly, training opportunities for clinicians to develop greater knowledge of the data and its possibilities should be introduced so that use of the information becomes a standard part of clinical practice, building on current expectations for clinical audit.

CONCLUSION

In Canada, there will not be any large-scale benefits from gathering masses of health data until the information is shared among providers and institutions, such as between a family physician and a hospital. Leadership is required to drive continuous change and quality improvement toward integrated care. To do so, appropriate incentives are required. Providers and provider teams need to be held accountable for improvements to happen.

One key characteristic shared by many leading healthcare jurisdictions is the incentive to improve outcomes for patients at risk, in contrast to the fee-for-service reimbursement models that create incentives for higher treatment volumes. Leaders need to set goals and incentives for improved quality of outcomes and hold institutions and clinicians accountable for achieving those goals.

Achieving healthcare transformation requires changing the structure and processes of healthcare. Organizational and cultural changes are to be expected when implementing best-evidence practices in healthcare. Introducing such an approach in an environment where there is a lack of sufficient political and managerial determination and a commitment to adopt the changes is bound to fail. At the same time, it is difficult to justify spending public money on EHRs unless the benefits exceed costs.

Canadian governments have invested significant resources and effort to date in digitizing health data for a number of organizations and users, including hospitals, diagnostic imaging and labs,

9 Establishing an exchange of health information currently depends on system vendors deciding whether it is in line with their commercial interests. Some believe that Canada remains vulnerable to data being captured in proprietary systems and being unavailable to information exchange initiatives except at significant cost. The jurisdictions in Canada's healthcare system should review with their healthcare organizations whether any such barriers are in place. Where appropriate, further regulation or contractual requirements, including development of standards for clinical exchange of information, may be needed.

etc. The next key phase is ensuring the exchange of such information among users. According to David Blumenthal, the former head of the United States Health Information Technology strategy, *"Creating a robust exchange system isn't only an IT problem; rather, it's a problem of social, cultural, legal, institutional, economic, and political proportions. The technical part is actually the least challenging."*

References

Accenture. 2012. "Connected Health: The Drive to Integrated Healthcare Delivery." December.

Adler-Milstein, Julia. 2014."Benchmarking health IT among OECD countries: better data for better policy." *Journal of the American Medical Informatics Association*. 21:111-116.

Alberta Office of the Auditor General. 2013. "Select Electronic Health Record Processes." Report of the Auditor General. Edmonton. Office of the Auditor General.

Alharthi, Mansour. 2012. Masters Thesis. *Telehealth Practice in Eight Countries: New Zealand, Australia, the USA, Canada, UK, Malaysia, China and India.* Massey University. New Zealand.

Anderson, G.F., et al. "Health Care Spending And Use Of Information Technology In OECD Countries." *Health Affairs*. May 2006 25 (3): 819-831.

Banner Health. 2014. "Focus On: Electronic Medical Records and Sepsis: Bringing Down a Killer at Banner Health." http://www.bannerhealth.com/About+Us/Innovations/Electronic+Medical+Record/EMR+and+Sepsis.htm (Date of Access: March 3, 2015)

Blomqvist, Åke, and Colin Busby. 2012. *How to Pay Family Doctors: Why Pay Per Patient is Better than Fee For Service*. Commentary 365. Toronto: C.D. Howe Institute. October.

British Columbia Office of the Auditor General. 2010. "Electronic Health Record Implementation in British Columbia." Victoria. Office of the Auditor General of British Columbia.

Canada Office of the Auditor General. 2010. "Electronic Health Records in Canada – An Overview of Federal and Provincial Audit Reports." Ottawa. Office of the Auditor General of Canada.

Canadian Telehealth Report. 2013. Toronto. COACH.

Canadian Medical Association. 2013. "National Physician Survey 2013." Ottawa.

Conference Board of Canada. 2014. "Family Doctor Incentives: Getting Closer to the Sweet Spot." Ottawa. May.

Gillam, Stephen. 2011. "Pay for Performance in UK General Practice – The Ambiguous Impact of the Quality and Outcomes Framework." Rockville, Md. National Quality Measures Clearinghouse. March.

Guerriere, Michael, and Justin Kim J. 2014. "Taking an aggressive stance on EMRs: lessons from the US and UK." Montreal. TelusHealth. IV Newsletter. Spring.

Health Council of Canada. 2012. "How do Canadian primary care physicians rate the health system?" Toronto.

Himss Analytics. 2014. "Stage 7 Case Studies: NorthShore." http://himssanalytics.org/emram/stage7caseStudies.aspx?hospID=37 (Date of Access: March 3, 2015)

Intermountain Healthcare. 2011. News Bulletin. http://intermountainhealthcare.org/services/medicalgroup/clinics/physicianclinics/afsurgical/aboutus/pages/news.aspx?newsid=641 (Date of Access: March 3, 2015)

JASONYES The MITRE Corporation. 2014. "Robust Health Data Infrastructure." Agency for Healthcare Research and Quality. Rockville, Md. April.

Jha, A.K., et al. 2008. "The Use of Health Information Technology in Seven Nations." *International Journal of Medical Informatics*. Volume 7, No. 7, pp 848–854.

Leatt, Peggy, George Pink and Michael Guerriere. "Towards a Canadian Model of Integrated Healthcare." *Healthcare Papers*. 1(2) 2000.

Ontario Office of the Auditor General. 2009. "Ontario's Electronic Health Records Initiative." Toronto: Office of the Auditor General of Ontario.

Protti, D.J. 2007. "A Comparison of Information Technology in General Practice in Ten Countries, Electronic Healthcare." *Healthcare Quarterly*, Vol. 10, No. 2.

Protti, Denis. 2009. "Integrated Care Needs Integrated Information Management and Technology." *Healthcare Quarterly*. Vol.13 Special Issue. October.

Protti, Denis, et al. 2009. "Adoption of Information Technology in Primary Care Physician Offices in New Zealand and Denmark." *Informatics in Primary Care*.

PwC. 2013. "The emerging benefits of electronic medical record use in community-based care." April. Toronto.

Roland, Martin, and Stephen Campbell. "Successes and Failures of Pay for Performance in the United Kingdom." *New England Journal of Medicine*. 370:1944-1949. May 15, 2014.

Rozenblum, Ronen, et al. 2011. "A Qualitative Study of Canada's Experience with the Implementation of Electronic Health Information Technology." *Canadian Medical Association Journal*. 183(5). March.

Schoen, Cathy, et al. 2012. "A Survey of Primary Care Doctors in Ten Countries Shows Progress in Use of Health Information Technology, Less in Other Areas." *Health Affairs*. 31(12), 2805-2816. November.

Sittig, D.F. 1994. "Grand Challenges in Medical Informatics?" *Journal of the American Medical Informatics Association*. 1 (5), 412-413.

Sutherland, Jason, R. Trafford Crump, Nadya Repin, and Erik Hellsten. 2013. *Paying for Hospital Services: A Hard Look at the Options*. Commentary 365. Toronto: C.D. Howe Institute. April.

Zimlichman, Eyal, et al. 2012. "Lessons from the Canadian National Health Information Technology Plan for the United States: Opinions of Key Canadian Experts." *Journal of the American Medican Informatics Association*. 19:453-459. 2012. May/June.

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